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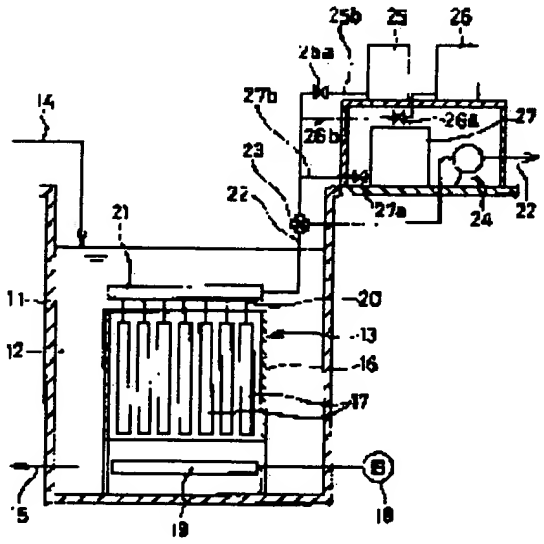
(54) WASHING METHOD OF IMMERSION TYPE MEMBRANE CARTRIDGE

(57)Abstract:

PURPOSE: To efficiently and economically wash an immersion type membrane cartridge without taking it out from a treating tank.

CONSTITUTION: In the state that the immersion type membrane cartridge is immersed into an activated sludge mixture liquid 12 and filtering and aeration are stopped, a chemical liquid is poured into a permeated water flow path of the membrane cartridge 17 under low pressure to be held for a proper time, and next clean water is poured into the permeated water flow path while the chemical liquid is permeated to a liquid side to be treated, to replace the inside of the permeated water flow path with the clean water.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The washing approach of the dipping former film cartridge which pours in a drug solution with low voltage into the permeated water passage of said film cartridge, carries out suitable time amount maintenance in the condition of having suspended aeration, and is characterized by permuting the inside of permeated water passage in Shimizu, pouring in Shimizu and leaching said drug solution to a processed liquid side subsequently to in said permeated water passage while a dipping former film cartridge is immersed into a processed liquid and stopping filtration.
[Claim 2] It is the washing approach of the dipping former film cartridge according to claim 1 which pours in a drug solution with low voltage into the permeated water passage of a film cartridge, carries out suitable time amount maintenance about each drug solution, and is characterized by performing the process which permutes the inside of permeated water passage in Shimizu, pouring in Shimizu and leaching said drug solution to a processed liquid side subsequently to in said permeated water passage in case two or more kinds of drug solutions are used.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the washing approach of the dipping former film cartridge used for a solid-liquid-separation application in activated sludge treatment, a sludge coagulation treatment, etc. of organic waste water.
[0002]
[Description of the Prior Art] Conventionally, in the facility which performs activated sludge treatment, a sludge coagulation treatment, etc. of organic waste water, the dipping former membrane separation device immersed and installed into the processed liquid for example, in a processing tub as a solid-liquid separator which separates active sludge and condensation sludge is used. A dipping former membrane separation device is a thing as shown in drawing 2 , in the box-like casing 1 in which the upper and lower sides carried out opening, has arranged to juxtaposition the plate-like film cartridge 2 arranged in the vertical direction at suitable spacing, and arranges the powder trachea 3 of the film cartridge 2 caudad connected to air-supply means (not shown), such as a blower. The film cartridge 2 is making the front face and the interior of the film base material 4 which were covered by the filtration membrane 5 with the permeated water passage 6, and is making the suction means (not shown) open this permeated water passage 6 for free passage while it arranges the organic filtration membranes 5 and 5 to both sides of the film base material 4.
[0003] In case solid liquid separation is performed, by carrying out the load of the suction force into the permeated water passage 6 of the film cartridge 2 with a suction means, suspended solids, such as active sludge, were caught by the filtration membrane 5, and the permeated water which penetrated the filtration membrane 5 and flowed in the permeated water passage 6 is taken out. At this time, aeration air is supplied through the powder trachea 3, and the upper counterflow of ****** which the air bubbles of aeration air have, and the processed liquid which occurs according to an airlift operation of air bubbles is washing the front face of a filtration membrane 5.
[0004]
[Problem(s) to be Solved by the Invention] The film cartridge 2 which was described above is difficult to wash for eye backlash are immersed into the processed liquid when drug solution washing is needed for the various reasons of a rapid concentration change etc., while energy saving can be aimed at, since solid liquid separation can be carried out without carrying out the load of the big suction force.
[0005] For this reason, although the approach which takes out the whole dipping former membrane separation device (henceforth a membrane separation device) from a processing tub, and is immersed in a drug solution washing tub, the approach of filling a drug solution in a tub after discharging all the processed liquids in a processing tub, etc. are proposed, large-scale equipment is required for all, and is not economical. Moreover, in drug solution washing from such an outside (processed liquid side) of a filtration membrane, since it can be hard to take dirt, such as sludge which adhered on the surface of the filtration membrane, it is necessary to also perform physical washing by sponge etc.
[0006] Moreover, although the washing approach of pouring in a drug solution inside a filtration membrane (permeated water passage), and leaching outside (processed liquid side) in the condition that the film cartridge was immersed into the processed liquid is also proposed, and a cleaning effect is high, the drug solution which exuded since chemical feeding was performed carrying out aeration diffuses this washing approach quickly in a

processed liquid, and its drug solution consumption increases.
[0007] This invention solves the above-mentioned technical problem, and it aims at the ability to be made to carry out drug solution washing of the dipping former film cartridge effectively and economically.
[0008]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the washing approach of the dipping former film cartridge of this invention While a dipping former film cartridge is immersed into a processed liquid and stopping filtration In the condition of having suspended aeration, a drug solution is poured in with low voltage into the permeated water passage of said film cartridge, suitable time amount maintenance is carried out, and the inside of permeated water passage is permuted in Shimizu, pouring in Shimizu and leaching said drug solution to a processed liquid side subsequently to in said permeated water passage.
[0009] Moreover, in case the washing approach of the dipping former film cartridge of this invention uses two or more kinds of drug solutions, about each drug solution, a drug solution is poured in with low voltage into the permeated water passage of a film cartridge, suitable time amount maintenance is carried out, and it is made to perform the process which permutes the inside of permeated water passage in Shimizu, it pouring in Shimizu and leaching said drug solution to a processed liquid side subsequently to in said permeated water passage.
[0010]
[Function] Since suitable time amount maintenance of the drug solution is supplied and carried out with low voltage to the place where the pressure by the side of a processed liquid and permeated water is maintaining fixed balance on both sides of the filtration membrane at a permeated water side according to the above-mentioned configuration, from the whole film surface of a filtration membrane, a drug solution exudes to a processed liquid side equally, and the whole filtration membrane surface is washed by the drug solution. Since aeration is suspended at this time, while the drug solution which exuded to the processed liquid side does not diffuse in a processed liquid immediately and the cleaning effect by the drug solution is heightened, the consumption of a drug solution decreases. Then, since the inside of permeated water passage is permuted by Shimizu, in case this Shimizu exudes to a processed liquid side, the drug solution which exists in the inside of permeated water passage or a filtration membrane is extruded to a processed liquid side. Therefore, without taking out the whole dipping former membrane separation device or a film cartridge from a processing tub, a filtration membrane can be washed effectively and economically and it is also prevented that a drug solution mixes with the permeated water after resumption of filtration.
[0011] Moreover, since the process which pours in and holds a drug solution in permeated water passage about each drug solution, and the process which permutes this drug solution by Shimizu are performed, washing in which the property of each drug solution was employed efficiently is not only performed, but the reaction of drug solutions is avoided.
[0012]
[Example] Hereafter, the example of this invention is explained, referring to a drawing.
(Example 1) In drawing 1 , an activated sludge tank 11 stores the active sludge mixed liquor 12 which comes to mix active sludge in processed water, is immersed into the active sludge mixed liquor 12, and is installing the dipping former membrane separation device 13 in the interior. 14 is a processed water supply pipe and 15 is the sludge drawn tube.
[0013] The dipping former membrane separation device 13 is constituted, when the upper and lower sides install the plate-like film cartridge 17 arranged in the vertical direction in juxtaposition at suitable spacing and install the powder trachea 19 of the film cartridge 17 caudad connected to the blower 18 in the interior of the box-like casing 16 which carried out opening. In this example, 100 film cartridges 17 with a die-length [of 1m] x width-of-face [of 0.5m] x thickness of 6mm are installed at intervals of 14mm.
[0014] The film cartridge 17 is constituted like the conventional thing explained using drawing 2 , and is equipped with the siphon 20 which is open for free passage to the permeated water passage inside a filtration membrane. The siphon 20 of each film cartridge 17 is connected to the header tubing 21, and the permeated water tubing 22 which makes this header tubing 21 ****** is led to the permeated water tub (not shown) of the exterior of an activated sludge tank 11. The suction pump 24 which carries out the load of the suction force is arranged in the permeated water passage of the film cartridge 17 through a change-over valve 23, and the header tubing 21 and the siphon 20 by the permeated water tubing 22.

[0015] 25, 26, and 27 are the 1st drug solution tank which stored the drug solution, the 2nd drug solution tank, and the freshwater tank which stored Shimizu, respectively, and these 1st drug solution tank 25, the 2nd drug solution tank 26, and a freshwater tank 27 are connected to a change-over valve 23 through the drug solution supply pipes 25b and 26b and Shimizu supply pipe 27b which infixed control valves 25a, 26a, and 27a, respectively while they are installed in the exterior of an activated sludge tank 11, and the upper part.
[0016] In the above-mentioned activated sludge tank 11, since the water permeate flow fell by contamination of a filtration membrane till 60% of the first stage while performing solid liquid separation, performing activated sludge treatment, as it was the following, the film cartridge 17 was washed.
[0017] While suspending installation of the processed water to an activated sludge tank 11, suspending the suction pump 24 and stopping filtration by the membrane separation device 13, the blower 18 was stopped and the aeration from the powder trachea 19 was suspended.
[0018] And in the condition that the film cartridge 17 was immersed into the active sludge mixed liquor 12, while switching the change-over valve 23, control-valve 25a was opened wide and 1% sodium hypochlorite solution of drug solution slack in the 1st drug solution tank 25 was poured in into the permeated water passage of the film cartridge 17 through drug solution supply pipe 25b, the permeated water tubing 22, the header tubing 21, and the siphon 20. The sodium hypochlorite solution was poured in in 4 - 5 minutes by gravity flow in the amount of 4-5l. per film cartridge 17 of one sheet. After ending impregnation, it was left for about 1 hour and the sodium hypochlorite solution was held in permeated water passage.
[0019] Subsequently, control-valve 25a was blockaded, control-valve 27a was opened wide, Shimizu in a freshwater tank 27 was poured in in the amount of one to 3 times of a sodium hypochlorite solution into the permeated water passage of the film cartridge 17 by gravity flow through Shimizu supply pipe 27b, this extruded the sodium hypochlorite solution to the active sludge mixed liquor 12 side, and the inside of permeated water passage was filled in Shimizu.
[0020] Then, after driving the blower 18 and starting the aeration from the powder trachea 19, when the change-over valve 23 was switched, the suction pump 24 was driven and filtration was resumed, the water permeate flow was recovered to initial value.
[0021] This maintains balance with the fixed pressure by the side of the active sludge mixed liquor 12 and permeated water on both sides of a filtration membrane. Since suitable time amount maintenance of a small amount of drug solution is supplied and carried out with low voltage in every part of a filtration membrane at a permeated water side to the place whose differential pressure by the side of the active sludge mixed liquor 12 and permeated water is fixed It is because a drug solution exudes equally from the whole film surface of a filtration membrane, the whole filtration membrane surface is effectively washed by the drug solution and the blinding of pore is canceled. Here, since it was thought that blinding matter was mainly organic nature pollutants, decomposition or the dissolution of organic nature pollutants was aimed at using the sodium hypochlorite solution. In addition, since the aeration from the powder trachea 19 is suspended at this time, while the drug solution which exuded through the filtration membrane does not diffuse in the active sludge mixed liquor 12 immediately, a drug solution piles up near the front face of a filtration membrane and a cleaning effect is heightened, the consumption of a drug solution decreases conventionally. If a high pressure is put on a permeated water side like before or a drug solution is supplied by the large flow rate, since only the upper part of a filtration membrane will be washed or evils, like pressure loss arises in permeated water passage, and exfoliation of a filtration membrane arises will happen, the washing approach of this example is desirable also from this point.
[0022] And since the inside of permeated water passage is permuted after drug solution washing in Shimizu, Shimizu exudes from a permeated water passage side to a processed water side through a filtration membrane, and the drug solution with which this Shimizu exists in the inside of permeated water passage and a filtration membrane is extruded to the active sludge mixed liquor 12 side. In addition, by preceding resuming filtration and starting aeration, the affix which did not exfoliate completely from a film surface depending on extraction of a drug solution and Shimizu also exfoliates physically, and, as for a cleaning effect, is raised more by the cellular style of aeration air.
[0023] Thus, without taking out the membrane separation device 13 whole or the film cartridge 17 from an activated sludge tank 11, drug solution washing of the filtration membrane of the film cartridge 17 can be carried out effectively, and this drug solution can be removed from the inside of permeated water passage, and

a filtration membrane. However, if the permeated water of fixed time amount after resumption of filtration is returned to down stream processing of the preceding paragraph and reworked, it can prevent certainly taking out the permeated water containing the drug solution which remained to the inside of permeated water passage, and a filtration membrane as treated water.
(Example 2) Since the water permeate flow fell by contamination of a filtration membrane till 60% of the first stage while performing solid liquid separation in the activated sludge tank 11 constituted like the example 1, performing activated sludge treatment Since the water permeate flow was recovered only till 75% of the first stage when the sodium hypochlorite solution washed the film cartridge 17 1% like the example 1, it was judged as that in which the pollutants of inorganic nature remain, and washed further. That is, after performing drug solution washing by the sodium hypochlorite solution 1% and permuting this sodium hypochlorite solution in Shimizu, it is the following, and made and washed.
[0024] While switching the change-over valve 23, control-valve 26a was opened wide and 1N hydrochloric acid of drug solution slack in the 2nd drug solution tank 25 was poured in into the permeated water passage of the film cartridge 17 through drug solution supply pipe 26b, the permeated water tubing 22, the header tubing 21, and the siphon 20. 1-N hydrochloric acid was poured in in 4 - 5 minutes by gravity flow in the amount of 4-5l. per film cartridge 17 of one sheet. After ending impregnation, it was left for about 1 hour and 1-N hydrochloric acid was held in permeated water passage.
[0025] Subsequently, control-valve 26a was blockaded, control-valve 27a was opened wide, Shimizu in a freshwater tank 27 was poured in into the permeated water passage of the film cartridge 17 by gravity flow through Shimizu supply pipe 27b in the amount of one to 3 times of 1-N hydrochloric acid, this extruded 1-N hydrochloric acid to the outside of a filtration membrane, and the inside of permeated water passage was filled in Shimizu.
[0026] Then, after driving the blower 18 and starting the aeration from the powder trachea 19, when the change-over valve 23 was switched, the suction pump 24 was driven and filtration was resumed, the water permeate flow was recovered to initial value.
[0027] As described above, when pore blinding matter is organic nature pollutants, it is effective to carry out drug solution washing in multistage story if needed using acids, such as oxalic acid and a hydrochloric acid, using sodium hypochlorite or a detergent, when it is inorganic nature pollutants.
[0028] In addition, in the above-mentioned example, although the membrane separation device which performs solid liquid separation by making suction force of a suction pump into driving force was illustrated, in the membrane separation device which performs solid liquid separation by making the natural water head of processed liquids, such as active sludge mixed liquor in a tub, into driving force, a film cartridge can be washed similarly. Moreover, if a film cartridge is not limited to the above-mentioned thing, either but makes the inside of a filtration membrane permeated water passage, what is made into permeated water passage can wash only the front face of a film base material similarly.
[0029]
[Effect of the Invention] While being able to wash a filtration membrane effectively over the whole surface by immersing a film cartridge into a processed liquid, and having been made to perform drug solution washing where aeration is suspended as mentioned above according to this invention, the consumption of a drug solution can be reduced.
[0030] Moreover, while the drug solution according to the pore blinding matter can wash effectively by having been made to perform the drug solution washing process to be used and which is washed with a drug solution for every drug solution, and the Shimizu permutation process of permuting a drug solution in Shimizu, efficient washing which avoided the reaction of drug solutions can be performed.

[Translation done.]

TECHNICAL FIELD

[Industrial Application] This invention relates to the washing approach of the dipping former film cartridge used for a solid-liquid-separation application in activated sludge treatment, a sludge coagulation treatment, etc. of organic waste water.

[Translation done.]

PRIOR ART

[Description of the Prior Art] Conventionally, in the facility which performs activated sludge treatment, a sludge coagulation treatment, etc. of organic waste water, the dipping former membrane separation device immersed and installed into the processed liquid for example, in a processing tub as a solid-liquid separator which separates active sludge and condensation sludge is used. A dipping former membrane separation device is a thing as shown in drawing 2 , in the box-like casing 1 in which the upper and lower sides carried out opening, has arranged to juxtaposition the plate-like film cartridge 2 arranged in the vertical direction at suitable spacing, and arranges the powder trachea 3 of the film cartridge 2 caudad connected to air-supply means (not shown), such as a blower. The film cartridge 2 is making the front face and the interior of the film base material 4 which were covered by the filtration membrane 5 with the permeated water passage 6, and is making the suction means (not shown) open this permeated water passage 6 for free passage while it arranges the organic filtration membranes 5 and 5 to both sides of the film base material 4.
[0003] In case solid liquid separation is performed, by carrying out the load of the suction force into the permeated water passage 6 of the film cartridge 2 with a suction means, suspended solids, such as active sludge, were caught by the filtration membrane 5, and the permeated water which penetrated the filtration membrane 5 and flowed in the permeated water passage 6 is taken out. At this time, aeration air is supplied through the powder trachea 3, and the upper counterflow of ****** which the air bubbles of aeration air have, and the processed liquid which occurs according to an airlift operation of air bubbles is washing the front face of a filtration membrane 5.

[Translation done.]

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EFFECT OF THE INVENTION

[Effect of the Invention] While being able to wash a filtration membrane effectively over the whole surface by immersing a film cartridge into a processed liquid, and having been made to perform drug solution washing where aeration is suspended as mentioned above according to this invention, the consumption of a drug solution can be reduced.
[0030] Moreover, while the drug solution according to the pore blinding matter can wash effectively by having been made to perform the drug solution washing process to be used and which is washed with a drug solution for every drug solution, and the Shimizu permutation process of permuting a drug solution in Shimizu, efficient washing which avoided the reaction of drug solutions can be performed.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] The film cartridge 2 which was described above is difficult to wash for eye backlash are immersed into the processed liquid when drug solution washing is needed for the various reasons of a rapid concentration change etc., while energy saving can be aimed at, since solid liquid separation can be carried out without carrying out the load of the big suction force.

[0005] For this reason, although the approach which takes out the whole dipping former membrane separation device (henceforth a membrane separation device) from a processing tub, and is immersed in a drug solution washing tub, the approach of filling a drug solution in a tub after discharging all the processed liquids in a processing tub, etc. are proposed, large-scale equipment is required for all, and is not economical. Moreover, in drug solution washing from such an outside (processed liquid side) of a filtration membrane, since it can be hard to take dirt, such as sludge which adhered on the surface of the filtration membrane, it is necessary to also perform physical washing by sponge etc.

[0006] Moreover, although the washing approach of pouring in a drug solution inside a filtration membrane (permeated water passage), and leaching outside (processed liquid side) in the condition that the film cartridge was immersed into the processed liquid is also proposed, and a cleaning effect is high, the drug solution which exuded since chemical feeding was performed carrying out aeration diffuses this washing approach quickly in a processed liquid, and its drug solution consumption increases.

[0007] This invention solves the above-mentioned technical problem, and it aims at the ability to be made to carry out drug solution washing of the dipping former film cartridge effectively and economically.

[Translation done.]

MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the washing approach of the dipping former film cartridge of this invention While a dipping former film cartridge is immersed into a processed liquid and stopping filtration In the condition of having suspended aeration, a drug solution is poured in with low voltage into the permeated water passage of said film cartridge, suitable time amount maintenance is carried out, and the inside of permeated water passage is permuted in Shimizu, pouring in Shimizu and leaching said drug solution to a processed liquid side subsequently to in said permeated water passage.

[0009] Moreover, in case the washing approach of the dipping former film cartridge of this invention uses two or more kinds of drug solutions, about each drug solution, a drug solution is poured in with low voltage into the permeated water passage of a film cartridge, suitable time amount maintenance is carried out, and it is made to perform the process which permutes the inside of permeated water passage in Shimizu, it pouring in Shimizu and leaching said drug solution to a processed liquid side subsequently to in said permeated water passage.

[Translation done.]

OPERATION

[Function] Since suitable time amount maintenance of the drug solution is supplied and carried out with low voltage to the place where the pressure by the side of a processed liquid and permeated water is maintaining fixed balance on both sides of the filtration membrane at a permeated water side according to the above-mentioned configuration, from the whole film surface of a filtration membrane, a drug solution exudes to a processed liquid side equally, and the whole filtration membrane surface is washed by the drug solution. Since aeration is suspended at this time, while the drug solution which exuded to the processed liquid side does not diffuse in a processed liquid immediately and the cleaning effect by the drug solution is heightened, the consumption of a drug solution decreases. Then, since the inside of permeated water passage is permuted by Shimizu, in case this Shimizu exudes to a processed liquid side, the drug solution which exists in the inside of permeated water passage or a filtration membrane is extruded to a processed liquid side. Therefore, without taking out the whole dipping former membrane separation device or a film cartridge from a processing tub, a filtration membrane can be washed effectively and economically and it is also prevented that a drug solution mixes with the permeated water after resumption of filtration.
[0011] Moreover, since the process which pours in and holds a drug solution in permeated water passage about each drug solution, and the process which permutes this drug solution by Shimizu are performed, washing in which the property of each drug solution was employed efficiently is not only performed, but the reaction of drug solutions is avoided.

[Translation done.]

EXAMPLE

[Example] Hereafter, the example of this invention is explained, referring to a drawing.
(Example 1) In drawing 1 , an activated sludge tank 11 stores the active sludge mixed liquor 12 which comes to mix active sludge in processed water, is immersed into the active sludge mixed liquor 12, and is installing the dipping former membrane separation device 13 in the interior. 14 is a processed water supply pipe and 15 is the sludge drawn tube.
[0013] The dipping former membrane separation device 13 is constituted, when the upper and lower sides install the plate-like film cartridge 17 arranged in the vertical direction in juxtaposition at suitable spacing and install the powder trachea 19 of the film cartridge 17 caudad connected to the blower 18 in the interior of the box-like casing 16 which carried out opening. In this example, 100 film cartridges 17 with a die-length [of 1m] x width-of-face [of 0.5m] x thickness of 6mm are installed at intervals of 14mm.
[0014] The film cartridge 17 is constituted like the conventional thing explained using drawing 2 , and is equipped with the siphon 20 which is open for free passage to the permeated water passage inside a filtration membrane. The siphon 20 of each film cartridge 17 is connected to the header tubing 21, and the permeated water tubing 22 which makes this header tubing 21 ****** is led to the permeated water tub (not shown) of the exterior of an activated sludge tank 11. The suction pump 24 which carries out the load of the suction force is arranged in the permeated water passage of the film cartridge 17 through a change-over valve 23, and the header tubing 21 and the siphon 20 by the permeated water tubing 22.
[0015] 25, 26, and 27 are the 1st drug solution tank which stored the drug solution, the 2nd drug solution tank, and the freshwater tank which stored Shimizu, respectively, and these 1st drug solution tank 25, the 2nd drug solution tank 26, and a freshwater tank 27 are connected to a change-over valve 23 through the drug solution supply pipes 25b and 26b and Shimizu supply pipe 27b which infixed control valves 25a, 26a, and 27a, respectively while they are installed in the exterior of an activated sludge tank 11, and the upper part.
[0016] In the above-mentioned activated sludge tank 11, since the water permeate flow fell by contamination of a filtration membrane till 60% of the first stage while performing solid liquid separation, performing activated sludge treatment, as it was the following, the film cartridge 17 was washed.
[0017] While suspending installation of the processed water to an activated sludge tank 11, suspending the suction pump 24 and stopping filtration by the membrane separation device 13, the blower 18 was stopped and the aeration from the powder trachea 19 was suspended.
[0018] And in the condition that the film cartridge 17 was immersed into the active sludge mixed liquor 12, while switching the change-over valve 23, control-valve 25a was opened wide and 1% sodium hypochlorite solution of drug solution slack in the 1st drug solution tank 25 was poured in into the permeated water passage of the film cartridge 17 through drug solution supply pipe 25b, the permeated water tubing 22, the header tubing 21, and the siphon 20. The sodium hypochlorite solution was poured in in 4 - 5 minutes by gravity flow in the amount of 4-5l. per film cartridge 17 of one sheet. After ending impregnation, it was left for about 1 hour and the sodium hypochlorite solution was held in permeated water passage.
[0019] Subsequently, control-valve 25a was blockaded, control-valve 27a was opened wide, Shimizu in a freshwater tank 27 was poured in in the amount of one to 3 times of a sodium hypochlorite solution into the permeated water passage of the film cartridge 17 by gravity flow through Shimizu supply pipe 27b, this extruded the sodium hypochlorite solution to the active sludge mixed liquor 12 side, and the inside of permeated water passage was filled in Shimizu.

[0020] Then, after driving the blower 18 and starting the aeration from the powder trachea 19, when the change-over valve 23 was switched, the suction pump 24 was driven and filtration was resumed, the water permeate flow was recovered to initial value.
[0021] This maintains balance with the fixed pressure by the side of the active sludge mixed liquor 12 and permeated water on both sides of a filtration membrane. Since suitable time amount maintenance of a small amount of drug solution is supplied and carried out with low voltage in every part of a filtration membrane at a permeated water side to the place whose differential pressure by the side of the active sludge mixed liquor 12 and permeated water is fixed It is because a drug solution exudes equally from the whole film surface of a filtration membrane, the whole filtration membrane surface is effectively washed by the drug solution and the blinding of pore is canceled. Here, since it was thought that blinding matter was mainly organic nature pollutants, decomposition or the dissolution of organic nature pollutants was aimed at using the sodium hypochlorite solution. In addition, since the aeration from the powder trachea 19 is suspended at this time, while the drug solution which exuded through the filtration membrane does not diffuse in the active sludge mixed liquor 12 immediately, a drug solution piles up near the front face of a filtration membrane and a cleaning effect is heightened, the consumption of a drug solution decreases conventionally. If a high pressure is put on a permeated water side like before or a drug solution is supplied by the large flow rate, since only the upper part of a filtration membrane will be washed or evils, like pressure loss arises in permeated water passage, and exfoliation of a filtration membrane arises will happen, the washing approach of this example is desirable also from this point.
[0022] And since the inside of permeated water passage is permuted after drug solution washing in Shimizu, Shimizu exudes from a permeated water passage side to a processed water side through a filtration membrane, and the drug solution with which this Shimizu exists in the inside of permeated water passage and a filtration membrane is extruded to the active sludge mixed liquor 12 side. In addition, by preceding resuming filtration and starting aeration, the affix which did not exfoliate completely from a film surface depending on extraction of a drug solution and Shimizu also exfoliates physically, and, as for a cleaning effect, is raised more by the cellular style of aeration air.
[0023] <TXF FR=0001 HE=185 WI=080 LX=0200 LY=0300> which takes out the membrane separation device 13 whole or the film cartridge 17 from an activated sludge tank 11 -- there are nothings, drug solution washing of the filtration membrane of the film cartridge 17 can be carried out effectively, and this drug solution can be removed from the inside of permeated water passage, and a filtration membrane. [thus,] However, if the permeated water of fixed time amount after resumption of filtration is returned to down stream processing of the preceding paragraph and reworked, it can prevent certainly taking out the permeated water containing the drug solution which remained to the inside of permeated water passage, and a filtration membrane as treated water.
(Example 2) Since the water permeate flow fell by contamination of a filtration membrane till 60% of the first stage while performing solid liquid separation in the activated sludge tank 11 constituted like the example 1, performing activated sludge treatment Since the water permeate flow was recovered only till 75% of the first stage when the sodium hypochlorite solution washed the film cartridge 17 1% like the example 1, it was judged as that in which the pollutants of inorganic nature remain, and washed further. That is, after performing drug solution washing by the sodium hypochlorite solution 1% and permuting this sodium hypochlorite solution in Shimizu, it is the following, and made and washed.
[0024] While switching the change-over valve 23, control-valve 26a was opened wide and 1N hydrochloric acid of drug solution slack in the 2nd drug solution tank 25 was poured in into the permeated water passage of the film cartridge 17 through drug solution supply pipe 26b, the permeated water tubing 22, the header tubing 21, and the siphon 20. 1-N hydrochloric acid was poured in in 4 - 5 minutes by gravity flow in the amount of 4-5l. per film cartridge 17 of one sheet. After ending impregnation, it was left for about 1 hour and 1-N hydrochloric acid was held in permeated water passage.
[0025] Subsequently, control-valve 26a was blockaded, control-valve 27a was opened wide, Shimizu in a freshwater tank 27 was poured in into the permeated water passage of the film cartridge 17 by gravity flow through Shimizu supply pipe 27b in the amount of one to 3 times of 1-N hydrochloric acid, this extruded 1-N hydrochloric acid to the outside of a filtration membrane, and the inside of permeated water passage was filled in Shimizu.

[0026] Then, after driving the blower 18 and starting the aeration from the powder trachea 19, when the change-over valve 23 was switched, the suction pump 24 was driven and filtration was resumed, the water permeate flow was recovered to initial value.
[0027] As described above, when pore blinding matter is organic nature pollutants, it is effective to carry out drug solution washing in multistage story if needed using acids, such as oxalic acid and a hydrochloric acid, using sodium hypochlorite or a detergent, when it is inorganic nature pollutants.
[0028] In addition, in the above-mentioned example, although the membrane separation device which performs solid liquid separation by making suction force of a suction pump into driving force was illustrated, in the membrane separation device which performs solid liquid separation by making the natural water head of processed liquids, such as active sludge mixed liquor in a tub, into driving force, a film cartridge can be washed similarly. Moreover, if a film cartridge is not limited to the above-mentioned thing, either but makes the inside of a filtration membrane permeated water passage, what is made into permeated water passage can wash only the front face of a film base material similarly.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the explanatory view having shown the whole activated sludge tank configuration which has arranged the dipping former membrane separation device and this equipment with which the washing approach of the dipping former film cartridge of this invention is applied.
[Drawing 2] It is the perspective view having shown the conventional dipping former membrane separation device whole configuration.
[Description of Notations]
11 Activated Sludge Tank
12 Active Sludge Mixed Liquor
13 Dipping Former Membrane Separation Device
17 Film Cartridge
19 Powder Trachea
25 1st Drug Solution Tank
26 2nd Drug Solution Tank
27 Freshwater Tank

[Translation done.]

* NOTICES *

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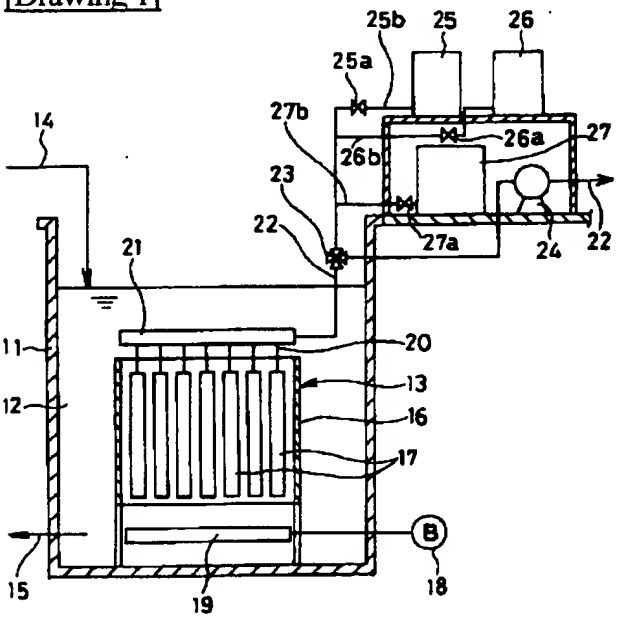
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

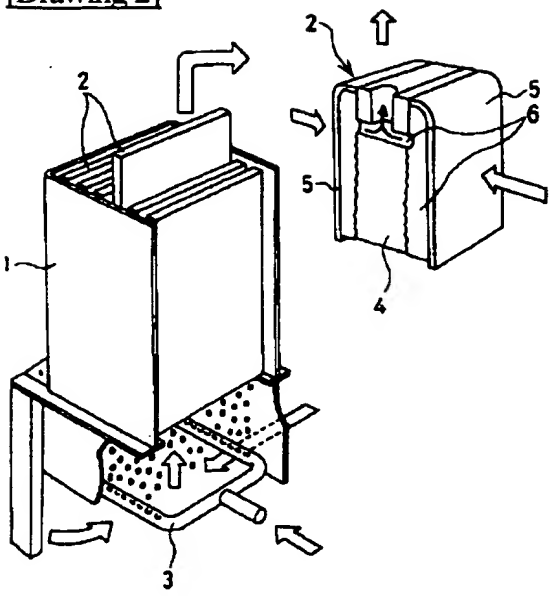
DRAWINGS

[Drawing 1]



11--- 活性汚泥槽
12--- 活性汚泥混合液
13--- 浸漬型膜分離装置
17--- 膜カートリッジ
19--- 散気管
25--- 第1薬液タンク
26--- 第2薬液タンク
27--- 清水タンク

[Drawing 2]



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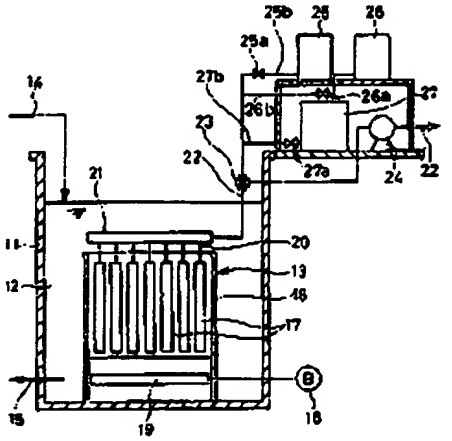
最終頁に続く

(54)【発明の名称】　浸漬型膜カートリッジの洗浄方法

(57)【要約】
【構成】　浸漬型膜カートリッジ１７を活性汚泥混合液１２中に浸漬し、濾過を停止するとともに曝気を停止した状態において、膜カートリッジ１７の透過水流路内に薬液を低圧で注入して適当時間保持し、次いで前記透過水流路内に清水を注入して前記薬液を被処理液側へ浸出させつつ透過水流路内を清水で置換する。
【効果】　浸漬型膜カートリッジを処理槽から取り出すことなく効果的かつ経済的に洗浄できる。



11--- 活性汚泥槽
12--- 活性汚泥混合液
13--- 浸漬型膜分離装置
17--- 膜カートリッジ
19--- 散気管
25--- 第１薬液タンク
26--- 第２薬液タンク
27--- 清水タンク

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【特許請求の範囲】

【請求項1】　浸漬型膜カートリッジを被処理液中に浸漬し、濾過を停止するとともに、曝気を停止した状態において、前記膜カートリッジの透過水流路内に薬液を低圧で注入して適当時間保持し、次いで、前記透過水流路内に清水を注入して前記薬液を被処理液側へ浸出させつつ透過水流路内を清水で置換することを特徴とする浸漬型膜カートリッジの洗浄方法。

【請求項2】　2種類以上の薬液を用いる際は、各薬液について、膜カートリッジの透過水流路内に薬液を低圧で注入して適当時間保持し、次いで、前記透過水流路内に清水を注入して前記薬液を被処理液側へ浸出させつつ透過水流路内を清水で置換する工程を行うことを特徴とする請求項1記載の浸漬型膜カートリッジの洗浄方法。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、有機性排水の活性汚泥処理や汚泥凝集処理などにおいて固液分離用途に用いられる浸漬型膜カートリッジの洗浄方法に関する。

【0002】

【従来の技術】従来、有機性排水の活性汚泥処理や汚泥凝集処理などを行う施設では、活性汚泥や凝集汚泥を分離する固液分離装置として、たとえば処理槽内の被処理液中に浸漬して設置する浸漬型膜分離装置を用いている。浸漬型膜分離装置は図2に示したようなものであり、上下が開口した箱状のケーシング1内に、上下方向に配置する平板状の膜カートリッジ2を適当間隔で並列に配置し、膜カートリッジ2の下方に、ブロワなどの給気手段（図示せず）に接続した散気管3を配置している。膜カートリッジ2は、膜支持体4の両面に有機濾過膜5、5を配置するとともに、濾過膜5で覆った膜支持体4の表面および内部を透過水流路6となしており、この透過水流路6を吸引手段（図示せず）に連通させている。

【0003】固液分離を行う際には、吸引手段によって膜カートリッジ2の透過水流路6内に吸引圧を負荷することにより、活性汚泥などの懸濁物質を濾過膜5で補捉し、濾過膜5を透過して透過水流路6内に流入した透過水を取り出している。このとき、散気管3を通じて曝気空気を供給し、曝気空気の気泡が持つ剪断力、および気泡のエアリフト作用により生起される被処理液の上向流により、濾過膜5の表面を洗浄している。

【0004】

【発明が解決しようとする課題】上記したような膜カートリッジ2は、大きな吸引圧を負荷することなく固液分離できるので省エネルギーを図れる反面、急激な濃度変化等種々の理由により薬液洗浄が必要となったときは、被処理液中に浸漬されているがために洗浄が困難である。

【0005】このため、処理槽から浸漬型膜分離装置

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（以下、膜分離装置という）全体を取り出して薬液洗浄槽に浸漬する方法や、処理槽内の被処理液を全て排出した後に、槽内に薬液を満たす方法などが提案されているが、いずれも大がかりな装置が必要であり、経済的ではない。また、このような、濾過膜の外側（被処理液側）からの薬液洗浄では、濾過膜の表面に付着した汚泥等の汚れが取れにくいため、スポンジなどによる物理的洗浄をも行う必要がある。

【0006】また、被処理液中に膜カートリッジを浸漬した状態で、濾過膜の内側（透過水流路）に薬液を注入して外側（被処理液側）へ浸出させる洗浄方法も提案されているが、この洗浄方法は、洗浄効果は高いものの、曝気しながら薬液注入を行っているため浸出した薬液が被処理液中にすばやく拡散してしまい、薬液消費量が多くなる。

【0007】本発明は上記課題を解決するもので、浸漬型膜カートリッジを効果的かつ経済的に薬液洗浄できるようにすることを目的とするものである。

【0008】

【課題を解決するための手段】上記課題を解決するために、本発明の浸漬型膜カートリッジの洗浄方法は、浸漬型膜カートリッジを被処理液中に浸漬し、濾過を停止するとともに、曝気を停止した状態において、前記膜カートリッジの透過水流路内に薬液を低圧で注入して適当時間保持し、次いで、前記透過水流路内に清水を注入して前記薬液を被処理液側へ浸出させつつ透過水流路内を清水で置換するようにしたものである。

【0009】また本発明の浸漬型膜カートリッジの洗浄方法は、2種類以上の薬液を用いる際は、各薬液について、膜カートリッジの透過水流路内に薬液を低圧で注入して適当時間保持し、次いで、前記透過水流路内に清水を注入して前記薬液を被処理液側へ浸出させつつ透過水流路内を清水で置換する工程を行うようにしたものである。

【0010】

【作用】上記構成によれば、濾過膜を挟んで被処理液側と透過水側の圧力が一定のバランスを保っているところへ、透過水側に低圧で薬液が供給されて適当時間保持されるので、濾過膜の膜面全体より均等に薬液が被処理液側へ浸出し、濾過膜全面が薬液により洗浄される。このとき、曝気が停止されているので、被処理液側へ浸出した薬液が直ちに被処理液中に拡散することはなく、薬液による洗浄効果が高められるとともに、薬液の消費量は少なくなる。その後、透過水流路内が清水により置換されるので、この清水が被処理液側へ浸出する際に透過水流路内や濾過膜に存在する薬液は被処理液側へ押し出される。したがって、浸漬型膜分離装置全体あるいは膜カートリッジを処理槽から取り出すことなく、濾過膜を効果的かつ経済的に洗浄でき、濾過再開後の透過水に薬液が混じることも防止される。

【００１１】また、各薬液について、透過水流路内に薬液を注入して保持する工程と、この薬液を清水により置換する工程とが行われるので、各薬液の特性を生かした洗浄が行われるだけでなく、薬液どうしの反応が回避される。

【００１２】

【実施例】以下、本発明の実施例を図面を参照しながら説明する。

（実施例１）図１において、活性汚泥槽１１は内部に、被処理水に活性汚泥を混合してなる活性汚泥混合液１２を貯留し、活性汚泥混合液１２中に浸漬して浸漬型膜分離装置１３を設置している。１４は被処理水供給管、１５は汚泥引抜管である。

【００１３】浸漬型膜分離装置１３は、上下が開口した箱状のケーシング１６の内部に、上下方向に配置される平板状の膜カートリッジ１７を適当間隔で並列に設置し、膜カートリッジ１７の下方に、ブロワ１８に接続した散気管１９を設置することにより構成されている。この実施例では、長さ１ｍ×幅０．５ｍ×厚さ６ｍｍの膜カートリッジ１７が１４ｍｍ間隔で１００枚設置されている。

【００１４】膜カートリッジ１７は、図２を用いて説明した従来のものと同様に構成されており、濾過膜の内側の透過水流路に連通する吸引管２０を備えている。各膜カートリッジ１７の吸引管２０はヘッダ管２１に接続しており、このヘッダ管２１を起端側とする透過水管２２が活性汚泥槽１１の外部の透過水槽（図示せず）まで導かれている。透過水管２２には、切換弁２３と、ヘッダ管２１と吸引管２０とを介して膜カートリッジ１７の透過水流路内に吸引圧を負荷する吸引ポンプ２４とが配設されている。

【００１５】２５，２６，２７はそれぞれ、薬液を貯留した第１薬液タンク，第２薬液タンク，清水を貯留した清水タンクであり、これら第１薬液タンク２５，第２薬液タンク２６，清水タンク２７はそれぞれ、活性汚泥槽１１の外部かつ上方に設置されるとともに、コントロール弁２５ａ，２６ａ，２７ａを介装した薬液供給管２５ｂ，２６ｂ，清水供給管２７ｂを介して切換弁２３に接続している。

【００１６】上記した活性汚泥槽１１において、活性汚泥処理を行いつつ固液分離を行う間に、濾過膜の汚染により透過水量が初期の６０％まで低下したので、以下のようにして膜カートリッジ１７の洗浄を行った。

【００１７】活性汚泥槽１１への被処理水の導入を停止し、吸引ポンプ２４を停止して膜分離装置１３による濾過を停止するとともに、ブロワ１８を停止して散気管１９からの曝気を停止した。

【００１８】そして、膜カートリッジ１７を活性汚泥混合液１２中に浸漬した状態において、切換弁２３を切り換えるとともに、コントロール弁２５ａを開放して、第

１薬液タンク２５内の薬液たる１％次亜塩素酸ソーダ溶液を、薬液供給管２５ｂ、透過水管２２、ヘッダ管２１、吸引管２０を通じて膜カートリッジ１７の透過水流路内に注入した。次亜塩素酸ソーダ溶液は、１枚の膜カートリッジ１７につき４～５リットルの量で自然流下にて４～５分で注入した。注入を終了した後、約１時間放置して、透過水流路内に次亜塩素酸ソーダ溶液を保持した。

【００１９】次いで、コントロール弁２５ａを閉塞し、コントロール弁２７ａを開放して、清水タンク２７内の清水を清水供給管２７ｂを通じて自然流下にて膜カートリッジ１７の透過水流路内に次亜塩素酸ソーダ溶液の１～３倍量で注入し、これにより次亜塩素酸ソーダ溶液を活性汚泥混合液１２側へ押し出して、透過水流路内を清水で満たした。

【００２０】その後、ブロワ１８を駆動して散気管１９からの曝気を開始してから、切換弁２３を切り換え、吸引ポンプ２４を駆動して濾過を再開したところ、透過水量は初期値まで回復した。

【００２１】これは、濾過膜を挟んで活性汚泥混合液１２側と透過水側の圧力が一定のバランスを保ち、濾過膜のどの部分でも活性汚泥混合液１２側と透過水側との圧力差が一定となっているところへ、透過水側に少量の薬液が低圧で供給されて適当時間保持されるので、濾過膜の膜面全体から均等に薬液が浸出し、濾過膜全面が薬液により効果的に洗浄されて細孔の目詰まりが解消されるからである。ここでは、目詰まり物質は主として有機性汚濁物質であると思われたので、次亜塩素酸ソーダ溶液を使用して有機性汚濁物質の分解または溶解を図った。なおこのとき、散気管１９からの曝気が停止されているので、濾過膜を通して浸出した薬液が直ちに活性汚泥混合液１２中に拡散することはなく、濾過膜の表面近傍に薬液が滞留して洗浄効果が高められるとともに、薬液の消費量は従来より少なくなる。従来のように透過水側に高い圧力をかけたり、大流量で薬液を供給すると、透過水流路内で圧力損失が生じて濾過膜の上部ばかりが洗浄されたり、あるいは濾過膜の剥離が生じるなどの弊害が起こるので、この点からもこの実施例の洗浄方法は好ましい。

【００２２】そして、薬液洗浄後に、透過水流路内が清水で置換されるので、濾過膜を通して透過水流路側から被処理水側へと清水が浸出し、この清水が透過水流路内および濾過膜に存在する薬液を活性汚泥混合液１２側へと押し出す。なお、濾過を再開するに先立って曝気が開始されることにより、薬液および清水の浸出によっては膜面から完全に剥離しなかった付着物も曝気空気の気泡流によって物理的に剥離され、洗浄効果はより高められる。

【００２３】このようにして、膜分離装置１３全体あるいは膜カートリッジ１７を活性汚泥槽１１から取り出す

ことなく、膜カートリッジ１７の濾過膜を効果的に薬液洗浄し、この薬液を透過水流路内および濾過膜から除去することができる。しかし、濾過再開後一定時間の透過水を前段の処理工程に戻して再処理するようにすれば、透過水流路内および濾過膜に残留した薬液を含んだ透過水を処理水として取り出すことを確実に防止できる。

（実施例２）実施例１と同様に構成した活性汚泥槽１１において、活性汚泥処理を行いつつ固液分離を行う間に、濾過膜の汚染によって透過水量が初期の６０％まで低下したので、実施例１と同様にして１％次亜塩素酸ソーダ溶液で膜カートリッジ１７の洗浄を行ったところ、透過水量は初期の７５％までしか回復しなかったので、無機性の汚濁物質が残存しているものと判断して、さらに洗浄を行った。すなわち、１％次亜塩素酸ソーダ溶液による薬液洗浄を行い、この次亜塩素酸ソーダ溶液を清水で置換した後に、以下のようにして洗浄した。

【００２４】切換弁２３を切り換えるとともに、コントロール弁２６ａを開放して、第２薬液タンク２５内の薬液たる１Ｎ塩酸を、薬液供給管２６ｂ、透過水管２２、ヘッダ管２１、吸引管２０を通じて膜カートリッジ１７の透過水流路内に注入した。１Ｎ塩酸は、１枚の膜カートリッジ１７につき４～５リットルの量で自然流下にて４～５分で注入した。注入を終了した後、約１時間放置して、透過水流路内に１Ｎ塩酸を保持した。

【００２５】次いで、コントロール弁２６ａを閉塞し、コントロール弁２７ａを開放して、清水タンク２７内の清水を清水供給管２７ｂを通じて自然流下にて膜カートリッジ１７の透過水流路内に１Ｎ塩酸の１～３倍量で注入し、これにより１Ｎ塩酸を濾過膜の外側へ押し出して、透過水流路内を清水で満たした。

【００２６】その後、ブロワ１８を駆動して散気管１９からの曝気を開始してから、切換弁２３を切り換え、吸引ポンプ２４を駆動して濾過を再開したところ、透過水量は初期値まで回復した。

【００２７】上記したように、細孔目詰まり物質が有機性汚濁物質である場合は次亜塩素酸ソーダや洗剤を用い、無機性汚濁物質である場合はシュウ酸や塩酸などの

酸を用いて、必要に応じ多段階的に薬液洗浄するのが効果的である。

【００２８】なお、上記した実施例においては、吸引ポンプの吸引圧を駆動力として固液分離を行う膜分離装置を例示したが、槽内の活性汚泥混合液等の被処理液の自然水頭を駆動力として固液分離を行う膜分離装置においても同様にして膜カートリッジを洗浄できる。また、膜カートリッジも上記のものに限定されず、濾過膜の内側を透過水流路とするものであれば、膜支持体の表面のみを透過水流路とするものなど、同様にして洗浄できる。

【００２９】

【発明の効果】以上のように本発明によれば、膜カートリッジを被処理液中に浸漬し、曝気を停止した状態で薬液洗浄を行うようにしたことにより、濾過膜を全面にわたり効果的に洗浄できるとともに、薬液の消費量を低減できる。

【００３０】また、使用する薬液ごとに、薬液で洗浄する薬液洗浄工程と、薬液を清水で置換する清水置換工程とを行うようにしたことにより、細孔目詰まり物質に応じた薬液によって効果的に洗浄できるとともに、薬液どうしの反応を回避した効率的な洗浄を行える。

【図面の簡単な説明】

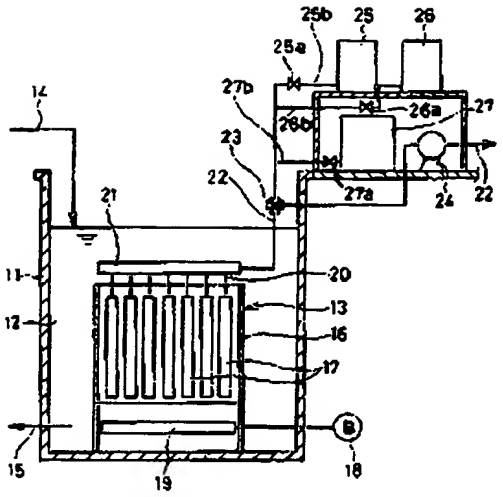
【図１】本発明の浸漬型膜カートリッジの洗浄方法が適用される浸漬型膜分離装置および同装置を配置した活性汚泥槽の全体構成を示した説明図である。

【図２】従来の浸漬型膜分離装置の全体構成を示した斜視図である。

【符号の説明】

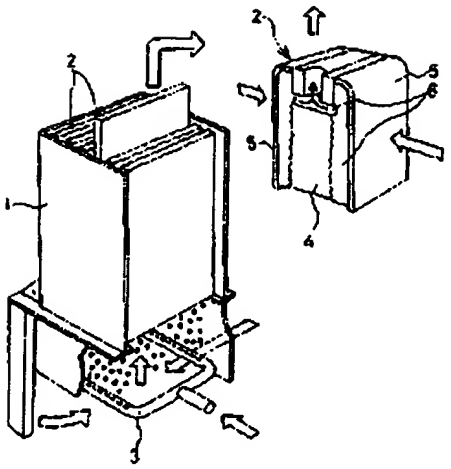
11　活性汚泥槽
12　活性汚泥混合液
13　浸漬型膜分離装置
17　膜カートリッジ
19　散気管
25　第１薬液タンク
26　第２薬液タンク
27　清水タンク

【図1】



11--- 活性汚泥槽
12--- 活性汚泥混合液
13--- 浸漬膜分離装置
17--- 膜カートリッジ
19--- 散気管
25--- 第1原液タンク
26--- 第2原液タンク
27--- 清水タンク

【図2】



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